



Bolt Maintenance at Switches

Applicability

ARTC Network Wide		Western Jurisdiction		New South Wales	✓	Victoria	
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Audience	Main Points	Change History
Corridor/Delivery Managers Team Managers Work Group Leaders Project/Delivery Engineers Engineering Compliance Managers	<p>Check for loose missing and incorrectly installed bolts in the switch area</p> <p>Keep bolts tight, correct torque and fully compressed washer</p> <p>Use correct length bolts</p> <p>Make sure stockrail is seated on the switch plate and holes are correctly aligned</p> <p>Take special care if Huckbolts are used</p> <p>For new work or upgrading make sure bolts are correctly aligned and stock-rail seated and retighten bolts after a few days</p>	Previously Civil Eng Instruction N0411 (RIC CTN 04/11)

There have been a number of instances where broken chair bolts have caused signal failures at points. Action by maintainers is important to reduce the incidence of this problem. Guidelines are attached with some illustrative photos.

Patrol/Inspection

When observing turnouts during track patrol, detailed walking or turnout inspection:-

- Keep an eye out for bolt condition in the switch area of turnouts including:
 - Holding down bolts/ spikes
 - Rail brace bolts/ switch stops
 - Nib bolts (that hold the rail brace to the brace plate in some timbers).
- Promptly tighten or report loose or missing bolts or conditions which are non-standard such as multiple washers. Both chair bolts and stud bolts are important.
- Loose bolts can be seen when the washer is not fully compressed.
- Note the locations of any broken bolts and check if the holes are misaligned. Record if there is a restriction to longitudinal movement of the timber such as a point motor attached
- Record as a defect where the stockrail is not supported by the plate ie there is a gap between the stockrail and the plate

Maintenance

- Always use the correct bolt length. Overlong bolts will not be able to be fully tightened. Use of multiple washers is poor practice and the bolt will quickly become loose.
- The correct switch stud bolts should always be used. Using the wrong size can cause the switch to jam. Grinding off ill-fitting stud bolts is not recommended. The resulting heat stress can cause future cracking and failure of the stud. If any ground-off studs are found they should be replaced.
- Make sure the spring washer is fully compressed.

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- If you can, tighten the bolt up to the recommended torque for that bolt type. Two types are in use - the traditional standard carbon bolts and the newer high-strength bolts (grade 8.8 which have an 8.8 stamped on the head). Torque settings for these are:
 - standard carbon - 248Nm (183ft.lbs)
 - high-strength - 640Nm (472ft.lbs)
- If an Impact Wrench ("rattle gun") is used you could still finish off tightening up the bolts with a torque wrench.
- Where manual methods are used the following is recommended:-
 - For standard bolts current tightening methods are OK ie fully tightened with small wrench/spanner of about 600mm length.
 - High-strength bolts should be tensioned to be fully tight with small wrench/spanner about 600mm (2 ft) and then tightened a further 1/3 of a turn with a large wrench/spanner about 1200mm (4ft).
- Bolts should not be reused but they can be tightened up in the same hole.
- Make sure the holes line up between the chair plate and the stockrail. There must be play between the bolt and edges of the hole. (i.e. the bolt easily slips through the hole and can be wobbled (jiggled) sideways and up and down before tightening. Mismatching holes will cause the bolt to sit unevenly and eventually cause it to fracture. Some minor readjustment of the bearer may be necessary.
- Ensure the stockrail foot rests fully on chair plate before tightening the bolt. This is especially important with 60kg undercut switch rails.
- If heat has been applied to a bolt to loosen the nut, the washer must be replaced before retightening the nut.
- Make sure holes are correctly lined up. May need to move timber slightly. Skewed bolts are more likely to break in service.
- Prior to track tamping being carried out make sure bolts in switches are all tight. This will help resist timbers being moved by tampers and causing bolts to be misaligned.
- After tamping has been carried, if practical, check to make sure bolts in switches are still tight.
- The use of Huck swage fastenings is an option but care is needed at installation with seating of stockrail and correct alignment of the holes. If Huck bolts are used and the stockrail foot is not fully resting on the chair plate, the rail brace can break resulting in the replacement of up to 4 Huck bolts (not very cost effective).
- Remember to check with Signal staff before carrying out any work on points in case signal adjustments are required.

Construction/Upgrading/Major Maintenance

In addition to the matters above:

- As a quality inspection during the construction and installation of turnouts, check that the stockrail foot rests fully on chair plate prior to operation and prior to the addition of signaling equipment such as signal motors. These can lock the turnout timbers into a relatively immovable position. Also check that chair plate and stockrail bolt holes line up.
- Take particular care with the support of the stockrail on the chair plate at newly constructed turnouts and the positioning of turnout ties in the switch area. Turnouts must always be constructed on a level surface and on proper alignment.
- When major maintenance is undertaken bolt tightness should be checked after a day or so and bolts re-tightened as required.



Figure 1 – Mismatched holes



Figure 2 – Bolts Loose - washer not fully compressed